

CLAIMS

What is claimed is:

- 1 1. An apparatus for control of a fluid flow, comprising:
2 measuring means for measuring a pump performance parameter; and
3 controller means for adjusting a fluid flow in response to the pump performance
4 parameter.
- 1 2. The apparatus of claim 1 wherein the measuring means comprises at least one sensor for
2 measuring at least one of a pump speed, voltage, electric current, and electric power.
- 1 3. The apparatus of claim 1 wherein the measuring means comprises at least one of a
2 voltage sensor, an electric current sensor, an electric power sensor, and a multi-
3 component sensor.
- 1 4. The apparatus of claim 1 wherein the controller means comprises a process control
2 computer for adjusting operation of at least one of a flow-control means and a pump.
- 1 5. The apparatus of claim 4 wherein the flow-control means comprises at least one of a
2 valve, a pneumatic actuator, an electric actuator, a hydraulic actuator, and a micro-electric
3 actuator.
- 1 6. The apparatus of claim 4 wherein the pump comprises a centrifugal pump.
- 1 7. An apparatus for control of a fluid flow, comprising:
2 measuring means for measuring a pump performance parameter;
3 means for comparing a measured pump performance parameter to a predetermined
4 target pump performance parameter; and
5 controller means for adjusting a fluid flow in response to a difference in the
6 measured pump performance parameter and the predetermined target pump performance
7 parameter.

- 1 8. The apparatus of claim 7 wherein the measuring means comprises at least one sensor for
2 measuring at least one of a pump speed, voltage, electric current, and electric power.
- 1 9. The apparatus of claim 7 wherein the measuring means comprises at least one of a
2 voltage sensor, an electric current sensor, an electric power sensor, and a multi-
3 component sensor.
- 1 10. The apparatus of claim 7 wherein the controller means comprises a process control
2 computer for adjusting operation of at least one of a flow-control means and a pump.
- 1 11. The apparatus of claim 10 wherein the flow-control means comprises at least one of a
2 valve, a pneumatic actuator, an electric actuator, a hydraulic actuator, and a micro-electric
3 actuator.
- 1 12. The apparatus of claim 10 wherein the flow-control means comprises means for adjusting
2 a system element to change the resistance to flow.
- 1 13. The apparatus of claim 10 wherein the pump comprises a centrifugal pump.
- 1 14. The apparatus of claim 7 further comprising means for delivering the fluid flow to means
2 for performing a supercritical process.
- 1 15. An apparatus for control of a fluid flow, comprising:
2 a pump;
3 a sensor for measuring a pump performance parameter; and
4 a controller for adjusting operation of the pump to control a fluid flow in response
5 to the pump performance parameter.
- 1 16. The apparatus of claim 15 wherein the pump performance parameter comprises at least
2 one of a pump speed, voltage, electric current, and electric power.

- 1 17. A system for supercritical processing of an object, comprising:
2 means for performing a supercritical process;
3 means for measuring a pump performance parameter; and
4 means for adjusting operation of a pump to control a fluid flow in response
5 to the pump performance parameter.
- 1 18. The system of claim 19 wherein the object is a semiconductor wafer for forming
2 integrated circuits.
- 1 19. The system of claim 19 wherein the means for performing a supercritical process
2 comprises a processing chamber and means for circulating at least one of a gaseous,
3 liquid, supercritical and near-supercritical fluid within the processing chamber.
- 1 20. The system of claim 21 wherein the fluid comprises carbon dioxide.
- 1 21. The system of claim 22 wherein at least one of solvents, co-solvents and surfactants are
2 contained in the carbon dioxide.
- 1 22. The system of claim 19 wherein the pump performance parameter comprises at least one
2 of a pump speed, voltage, electric current, and electric power.
- 1 23. The system of claim 19 further comprising means for delivering the fluid flow to the
2 means for performing a supercritical process.
- 1 24. A method of control of a fluid flow, comprising the steps of:
2 a. measuring a pump performance parameter; and
3 b. adjusting a fluid flow in response to the pump performance parameter.
- 1 25. The method of claim 26 wherein the pump operational parameter comprises at least one
2 of a pump speed, voltage, electric current, and electric power.

- 1 26. A method of eliminating flow meter contamination in semiconductor wafer processing
2 with a fluid, comprising the steps of:
3 a. measuring a pump operational parameter; and
4 b. adjusting operation of a pump to control a fluid flow in response to the pump
5 operational parameter.

- 1 27. A method of control of a fluid flow, comprising the steps of:
2 measuring a pump performance parameter;
3 comparing a measured pump performance parameter to a predetermined target
4 pump performance parameter; and
5 adjusting a fluid flow in response to a difference in the measured pump
6 performance parameter and the predetermined target pump performance parameter.

- 1 28. A method of control of a fluid flow in a supercritical processing system, comprising the
2 steps of:
3 a. defining a system curve including a point of operation;
4 b. using the system curve to define at least one of a predetermined pump speed,
5 voltage, electric current, and electric power;
6 c. measuring performance of a pump to obtain at least one of a measured pump
7 speed, voltage, electric current, and electric power;
8 d. comparing the at least one of a measured pump speed, voltage, electric current,
9 and electric power to the at least one of a predetermined pump speed, voltage,
10 electric current, and electric power;
11 e. adjusting operation of a pump to control a fluid flow in response to a difference in
12 the at least one of a measured pump speed, voltage, electric current, and electric
13 power and the at least one of a predetermined pump speed, voltage, electric
14 current, and electric power.